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NASA TECH BRIEF

Repair of Brazed Steel Honeycomb-Sandwich Panels with Vertical Pins Only

The complexity and cost of repairing brazed steel honeycomb panels have been reduced significantly by using vertical steel tubular pins. Transverse shear applied to honeycomb panels is carried by the core, and the connection of the core-to-face sheet is often removed or weakened due to undersized fillets. The shear strength can be restored, and the quality of the repaired panel considerably improved, by using vertical pins. Figure 1 shows the old and new methods for repairing the panels. The old method used diagonal and vertical pins in a triangulated truss arrangement. In the new method, the diagonal pins are eliminated and the vertical pins are welded to face sheets, forming a "Vierendeel Truss" arrangement to transmit the shear loads.

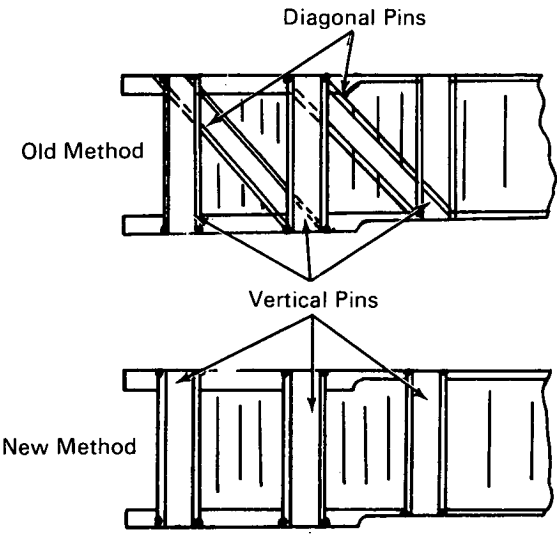

Figure 1. Methods of Repair; Sectional View

Figure 2 illustrates the location of the pins in the panel. Each pin has a wall thickness of 0.030-inch.

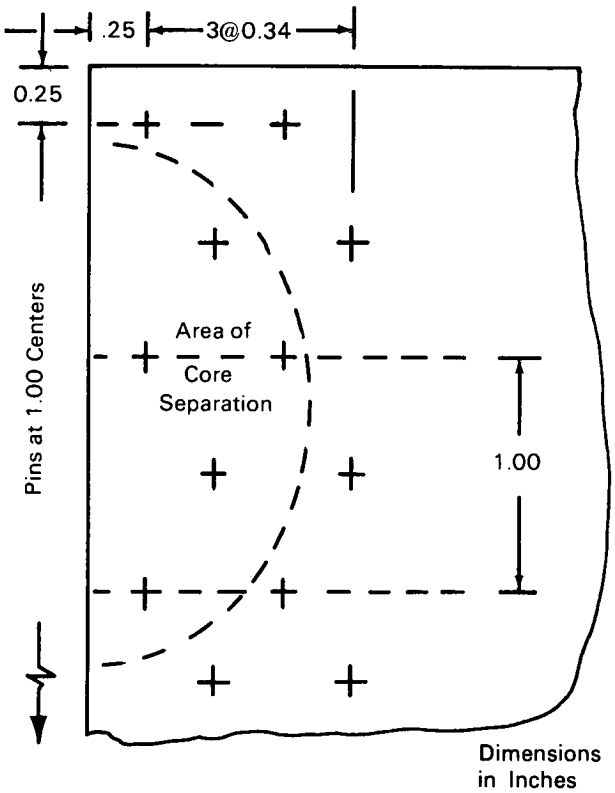

Figure 2. Location of Repair Pins in Panel

For a specific core, 1/8-in. staggered rows of pins at 1-in. centers are placed 0.34 in. apart throughout the weakened area of the core. The first row is placed beyond the weakened area. When the ends of the pins are welded to the face sheets, the pins form the webbing of a truss configuration, with the face sheets as the bars.

Mathematically, the shears and moments at each pin-to-face sheet can be calculated using slope deflec-

(continued overleaf)

tion equations. Critical moments, where each pin is welded to the face sheet, can be determined, and each pin-to-face joint can be evaluated analytically.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Manned Spacecraft Center, Code BM7
Houston, Texas 77058
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Patent status:

No patent action is contemplated by NASA.

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